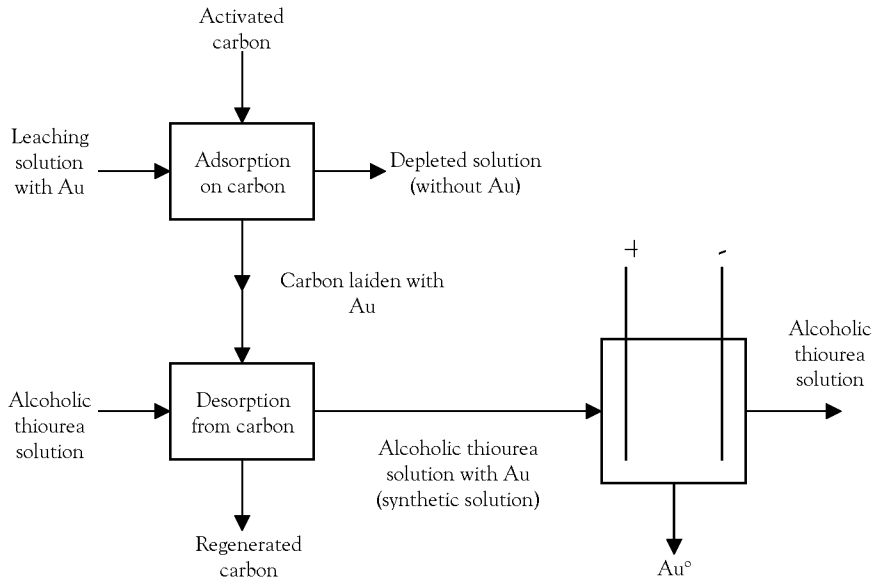
REMARKS

Claims 1-4 are now in the application. Claim 3 has been amended to recite "silver and gold values" in place of "the metallic values" for purposes of clarification and not to limit its scope. The amendments do not introduce any new matter and do not raise any new issues.

The rejection of claim 3 under 35 USC 112, second paragraph has been addressed by the above amendment to claim 3.

Claims 1 and 3 were rejected under 35 USC 102(b) as being anticipated by the publication to Urbanski et al. (hereinafter "Urbanski"). Claim 4 was also rejected under 35 USC 102(b) as being anticipated by the publication to Urbanski et al. Urbanski does not anticipate claims 1, 3 and 4.

Urbanski et al. investigated gold electrodeposition from alcoholic (20% v/v isopropanol in water) thiourea solutions, in an undivided electrolytic cell; where there is no separation by a membrane of the anodic and cathodic compartments. After citing several sources, which state that the direct gold electrodeposition from pregnant leaching solutions is not economically feasible, due to the low concentration of gold, Urbanski et al. used solutions similar to those that would result from the adsorption-desorption process on activated carbon. "In this paper, detailed studies are described of gold electrowinning from synthetic solutions. The solutions have a composition very close to that of typical eluates from activated carbon obtained by the elution with acidic solution of thiourea containing an alcohol admixture. Restricted technical facilities resulted in the use of a simple, undivided cell. (p.139)" In a schematic manner, Urbanski et al. suggest the following:



Contrary to the process referred to in Urbanski et al., the process according to the present invention eliminates the need for the adsorption-desorption process, employs only one leaching solution and uses the same electrical energy to electrodeposit the silver and/or gold and at the same time produces RSSR (formamidine disulfide, FADS), by partial oxidation of thiourea contained in the solution. Urbanski et al. mention that it would be better to employ an electrolytic cell, where the anodic and cathodic compartments are separated by a membrane, however they were not able to do so, due to inherent technical difficulties. Urbanski et al. confess that during their experimentation "Formation of toxic RSSR did not occur during electrolysis and the intermediate is practically absent after the process. (p. 151)." It is worth noting that Urbanski et al. did not perform their experimental work with separate compartments and only speculate in this sense at the end of the article (p. 151) that the results of the electrowinning could be improved by using a membrane to separate the compartments, if and only if adequate mixing is maintained in both compartments.

Therefore, the process proposed by Urbanski et al. is completely different from that of the present invention.

However, the problems apparently do not stem from the work performed by Urbanski et al., rather in their statements regarding information taken from the literature. Urbanski et al. state "The first step of the thiourea oxidation to formamidine disulphide (RSSR) is reversible and even useful because RSSR is a good oxidant for gold. (p. 138)". This fact is well known among the researchers in the field. However, up until the present invention, RSSR was only produced indirectly by the action of oxidants, such as hydrogen peroxide and ferric ion. According to the process of the present invention, the thiourea is electrolytically oxidized to RSSR exclusively, a procedure which offers the advantage of being completely controllable, in order to prevent the destruction (irreversible oxidation) of the thiourea, and does not introduce an external oxidant which could contaminate the solution. At no time; do Urbanski et al., nor others of any study reported in the literature, use RSSR, electrolytically produced in-situ, to leach gold and silver from minerals. Additionally, in the process of the present invention, the novelty of coupling both processes, the electrolytic production of RSSR and the electrowinning of gold and silver, in the same cell with the same energy, is introduced.

In another section, Urbanski et al. state "Thiourea present in the solution can be partially oxidized at the anode but its first oxidation product, RSSR, may be reduced on the gold deposition surface. The irreversible, further, anodic oxidation of thiourea is possible in time, which may deposit elemental sulphur on the cathode. Gold redissolution can occur by the action of RSSR oxidant as can hydrogen evolution which could diminish the rate of gold deposition. A membrane can then be used to separate the cathode compartment from the anode compartment (1,8,12,19–21,31,33–38,40–43). The consumption of thiourea during the gold electrowinning process depends on several, competitive processes and needs to be determined experimentally under specific process conditions. (see pages.138-139)". This section teaches another truth found in the literature: that partial and/or total thiourea oxidation and, consequently, leaching of the deposited gold and cathode passivation may occur in an undivided cell, therefore, justifying the use of a membrane. In no way, do Urbanski et al. suggest that the RSSR produced **haphazardly** at the anode be used specifically to leach gold from ores. In the present invention, RSSR is generated at the anode in a controlled process, then used, **in a reactor external to the electrolytic cell**, to leach gold and silver from minerals and other materials. After leaching, the

solid is separated and the solution, now with dissolved gold and/or silver, is sent to the cathodic compartment of the electrolytic cell, for these metals to be electrodeposited. This procedure is one of the patentable aspects of the present invention.

Although, the cathode materials (platinum, stainless steel and graphic, p. 139) referred to by Urbanski et al. coincide with that used in the present invention (stainless steel), these materials are commonly used for electrodeposition and are not the distinguishing features of the present invention.

The present claims involve processes: the production of RSSR in the anodic compartment of an electrolytic cell in controlled conditions for use as a gold and silver lixiviant; the electricity required for the process will be doubly utilized for RSSR production, as well as for gold and silver electrodeposition, making the process very efficient, in other words, as a benefit to the integral process.

Claims 2 was rejected under 35 USC 103 (a) as being unpatentable over Urbanski et al. in view of GB 2,349,876. The cited references do not render obvious claim 23. GB 2,349,876 does not overcome the above discussed deficiencies of Urbanski with respect to rendering unpatentable the present invention.

GB 2,349,876 states in the Summary of the Invention (p. 3, line 24 to p. 4, line 1): "The present invention provides a process for the hydrometallurgical recovery of noble metals from materials containing them by lixiviation with an aqueous acidic solution of thiourea in the presence of an oxidising agent and a reducing agent characterized in that the concentrations of thiourea and of formamidine disulphide in the solution are determined and an amount of oxidizing or reducing agent is added to the solution to maintain the molar ratio of thiourea: formamidine disulphide to between about 2: 1 and 5: 1. It has been found by the present inventors, that under such condition, high extraction, in the region of 90% in the case of gold, for example, can be achieved in relatively short reaction times while at the same time the irreversible degradation of thiourea may be suppressed. Not only may the loss by chemical degradation of thiourea be significantly reduced but, perhaps more importantly, by avoiding sulphur

precipitation the passivation of noble metal particles by the coating of reaction surfaces with sulphur is avoided." The aforementioned discussion refers to the addition of agents, oxidising or reducing, in order to maintain the Thiourea (Tu): Formamidine disulphide (FADS).

GB 2,349,876 also states in the Abstract: The oxidising agent may be ferric ion or hydrogen peroxide, the reducing agent may be SO_2 or metabisulphite and the acid may be sulphuric" and furthermore in Claim 1 (p. 11, lines 7-9) states: "… and an amount of oxidising agent or reducing agent is added to the solution to maintain the molar ratio of thiourea: formamidine disulphide to between about 2:1 and 5:1." In the examples, GB 2,349,876 employ both hydrogen peroxide and metabisulphite, as additives.

The process of the present invention is concerned with electrolytically oxidizing the thiourea to FADS exclusively, a procedure which offers the advantage of being completely controllable, in order to prevent the destruction (irreversible oxidation) of the thiourea, and does not introduce an external oxidant which could contaminate the solution.

Regarding the recovery of the values from the solution, GB 2,349,876 mentions only several alternatives, which are common procedures in the industry and are not claimed in their patent, stating (p. 6, lines 10-14): "The noble metal values may be stripped or recovered from the leachate by any means including: Carnon-in-Leach (CIL), Carbon in Pulp (CIP), cementation onto iron or aluminum; by adsorption onto biomass or ion exchange resin; or obtained by direct electrowinning or by other methods known to those skilled in the art." In the process of the present invention, the novelty of coupling both processes, the electrolytic production of FADS and the electrowinning of gold and silver, in the same cell with the same energy, are introduced and recited in claim 2. The present invention contributes an integral process for the leaching and electrowinning of precious metals.

In view of the above, consideration and allowance are respectfully solicited.

In the event the Examiner believes an interview might serve in any way to advance the prosecution of this application, the undersigned is available at the telephone number noted below.

The Office is authorized to charge any necessary fees to Deposit Account No. 22-0185, under Order No. 21879-00063-US1 from which the undersigned is authorized to draw.

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Respectfully submitted,

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